REMARKS

Claims 1-19 were examined on their merits and claim 20 has been added to the application. Therefore, claims 1-20 are all the claims presently pending in the application.

Formal Matters

1. Claims 3 and 8 stand objected to as containing informalities. Applicant has amended the claims as suggested by the Examiner and respectfully requests that the Examiner withdraw the objection.

2. Applicant has rewritten claim 12 in independent form, including all the limitations of the base claim and any intervening claims, as suggested by the Examiner. Applicant submits that claim 12 is now in condition for allowance.

3. Applicant thanks the Examiner for acknowledging the Applicant's claim to priority.

Art Rejections

1. Claims 1-10 and 13-19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kitahara et al EP 0827838 ("Kitahara") in view of Barbehenn et al. U.S. Application No. 5,363,134 ("Barbehenn") and Banno et al. U.S. Patent No. 6,060,113 ("Banno"). Claims 1, 3, 6 and 8 are all independent claims. Applicant respectfully traverses this rejection for at least the reasons stated below.

Independent claim 1

Claim 1 states that ID data is provided to identify representative nozzle orifices and that a reference drive signal is applied to piezoelectric vibrators to jet liquid droplets from the nozzle orifices. Also, amounts of the respective liquid droplets jetted from the respective identified nozzle orifices are measured, and a difference between the designated amount and the measured amount of each liquid droplet is identified. Furthermore, correction data is provided for reducing the difference and is associated with the respective nozzle orifices identified by the ID data.

The Examiner seems to maintain that Banno teaches identifying a difference between a designated amount and measured amount of a liquid droplet, providing correction data for reducing the difference, and adjusting the displacement behavior of the piezoelectric vibrator. However, assuming arguendo that the Examiner is correct, Banno does not disclose, teach or suggest associating correction data with the respective nozzle orifices identified by the ID data. Rather, Banno generally states that the height and width of a driving pulse is based on a correction signal received from the ejection condition correcting circuit. Furthermore, Banno merely applies the correction data to the second ejection operation and not to a respective nozzle orifice identified by ID data. In short, there is absolutely no disclosure in Banno of associating correction data with a respective nozzle orifice identified by ID data.

Since Kitahara and Barbehenn do not cure the deficient teachings of Banno, Applicant submits that claim 1 is patentable.

Independent Claims 3, 6 and 8

Since claims 3, 6 and 8 contain features that are similar to the features discussed above in conjunction with independent claim 1, Applicant submits that they and their respective dependent claims are patentable for at least such reasons.

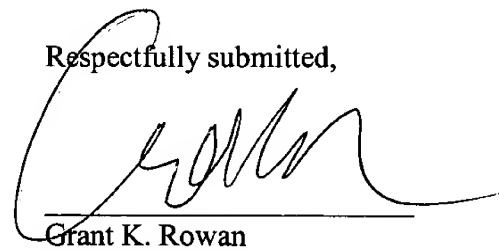
2. Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Kitahara et al. al EP 0827838 ("Kitahara") in view of Barbehenn et al. U.S. Application No. 5,363,134 ("Barbehenn") and Banno et al. U.S. Patent No. 6,060,113 ("Banno") with regard to claim 8, and in further view of Bain U.S. Patent No. 4,521,786 ("Bain").

Since claim 11 depends on claim 8, and since Bain does not cure the deficient teachings of Kitahara, Barbehenn and Banno with respect to claim 8, Applicant submits that claim 11 is patentable.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

1. (Twice Amended) A method jetting liquid droplets, comprising the steps of:

providing a liquid jetting head which includes: a plurality of nozzle orifices; a plurality of pressure generation chambers associated with the nozzle orifices; and a plurality of piezoelectric vibrators for respectively varying the volume of the associated pressure generation chamber to jet a liquid droplet from the associated nozzle orifice;

providing ID data for identifying the respective nozzle orifices;

providing a reference drive signal which is applied to the piezoelectric vibrator such that a reference liquid droplet having a designated amount is jetted from the nozzle orifice;

applying the reference drive signal to the respective piezoelectric vibrators to jet liquid droplet from the nozzle orifices;

measuring amounts of the respective liquid droplets jetted from the respective identified nozzle orifices by the reference drive signal;

identifying a difference between the designated amount and the measured amount of each liquid droplet;

providing correction data for reducing the difference; ~~and~~

associating the correction data with the respective nozzle orifices identified by the ID data; and

storing the associated correction data;

adjusting a displacement behavior of a piezoelectric vibrator associated with the identified nozzle orifice, based on the associated correction data.

3. (Twice Amended) A method of jetting liquid droplets, comprising the steps of:

providing a liquid jetting head which includes: a plurality of nozzle orifices; a plurality of pressure generation chambers associated with the nozzle orifices; and a plurality of piezoelectric vibrators for respectively varying the volume of the associated pressure generation chamber to jet a liquid droplet from the associated nozzle orifice;

setting a single jetting cycle as a period in which N drive signals are applicable to the piezoelectric vibrators to jet liquid droplets from the nozzle orifices, N being an integer;

providing ID data for identifying the respective nozzle orifices;

providing a reference drive signal which is applied to the piezoelectric vibrator such that a reference liquid droplet having a designated amount is jetted from the nozzle orifice;

applying the reference drive signal to the respective piezoelectric vibrators to jet liquid droplets from the nozzle orifices;

measuring amounts of the respective liquid droplets jetted from the respective identified nozzle orifices by the reference drive signal;

identifying a difference between the designated amount and the measured amount of each liquid droplet;

providing correction data for reducing the difference;

associating the correction data with the respective nozzle orifices identified by the ID data; and

storing the associated correction data;

selecting M drive signals ~~form~~ from the N drive signals based on the associated correction data, M being an integer which is equal to or less than N; and

applying the M drive signals to the piezoelectric vibrators within the single jetting cycle.

6. (Twice Amended) A liquid jetting apparatus, comprising:

a liquid jetting head including: a plurality of nozzle orifices; a plurality of pressure generation chambers associated with the nozzle orifices; and a plurality of piezoelectric vibrators for respectively varying the volume of the associated pressure generation chamber to jet a liquid droplet from the associated nozzle orifice;

a drive signal generator, for generating a plurality of drive signals, respectively driving the piezoelectric vibrators, within a single jetting cycle of the liquid jetting head;

an ID data storage, for storing ID data which identifies the respective nozzle orifices;

a reference drive signal generator, for generating a reference drive signal which is applied to the piezoelectric vibrator such that a reference liquid droplet having a designated amount is jetted from the nozzle orifice;

a reference drive signal applier, for applying the reference drive signal to the respective piezoelectric vibrators to jet liquid droplet from the nozzle orifices;

an identifier, for measuring amounts of the respective liquid droplets jetted from the respective identified nozzle orifices by the reference drive signal, and identifying a difference between the designated amount and the measured amount of each liquid droplet;

a correction data storage, for storing correction data which reduces the difference, and the correction data associated with the respective nozzle orifices identified by the ID data; and

a drive signal supplier, for selecting at least one drive signal from the plural drive signals to adjust a displacement behavior of a piezoelectric vibrator associated with the identified nozzle orifice, based on the associated correction data.

8. (Twice Amended) A liquid jetting apparatus, comprising:

a liquid jetting head including: a plurality of nozzle orifices; a plurality of pressure generation chambers associated with the nozzle orifices; and a plurality of piezoelectric vibrators

for respectively varying the volume of the associated pressure generation chamber to jet a liquid droplet from the associated nozzle orifices;

at least one drive signal generator, for generating N drive signals, respectively driving the piezoelectric vibrators, within a single jetting cycle of the liquid jetting head, N being an integer which is not less than 3;

an ID data storage, for storing ID data which identifies the respective nozzle orifices;

a reference drive signal generator, for generating a reference drive signal which is applied to the piezoelectric vibrator such that a reference liquid droplet having a designated amount is jetted from the nozzle orifice;

a reference drive signal applier, for applying the reference drive signal to the respective piezoelectric vibrators to jet liquid droplets from the nozzle orifices;

an identifier, for measuring amounts of the respective liquid droplets jetted from the respective identified nozzle orifices by the reference drive signal, and identifying a difference between the designated amount and the measured amount of each liquid droplet;

a correction data storage, for storing correction data which reduces the difference, and the correction data associated with the respective nozzle orifices identified by the ID data; and

a drive signal supplier, for identifying a nozzle orifice in which the jetting amount is to be corrected, through use of the ID data, and selecting M drive signals ~~form~~ from the N drive signals to adjust a displacement behavior of a piezoelectric vibrator associated with the identified

nozzle orifice, based on the associated correction data, M being an integer which is equal to or less than N.

12 (Amended) A method jetting liquid droplets, comprising the steps of:

providing a liquid jetting head which includes: a plurality of nozzle orifices; a plurality of pressure generation chambers associated with the nozzle orifices; and a plurality of piezoelectric vibrators for respectively varying the volume of the associated pressure generation chamber to jet a liquid droplet from the associated nozzle orifice;

providing ID data for identifying the respective nozzle orifices;

providing a reference drive signal which is applied to the piezoelectric vibrator such that a reference liquid droplet having a designated amount is jetted from the nozzle orifice;

applying the reference drive signal to the respective piezoelectric vibrators to jet liquid droplet from the nozzle orifices, wherein a plurality of drive signals for driving the piezoelectric vibrators to jet liquid droplets from the nozzle orifices is provided, the drive signals respectively having different liquid jetting energy from each other, and wherein at least one drive signal within a single jetting cycle of the jetting head is selected and applied to the piezoelectric vibrator;

measuring amounts of the respective liquid droplets jetted by the reference drive signal;

identifying a difference between the designated amount and the measured amount of each liquid droplet, wherein volume differences among the liquid droplets ejected by the respective

drive signals can be divided by a volume of a liquid droplet which is the minimum volume jetted by one drive signal;

providing correction data for reducing the difference; and

adjusting a displacement behavior of a piezoelectric vibrator associated with the identified nozzle orifice, based on the correction data.

Please add the following new claim:

20. The liquid jetting method as set forth in claim 2, wherein volume differences among the liquid droplets ejected by the respective drive signals can be divided by a volume of a liquid droplet which is the minimum volume jetted by one single drive signal.